



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/539,074	06/15/2005	Takanari Yamaguchi	2185-0764PUS1	9227
2292 7590 04/25/2007 BIRCH STEWART KOLASCH & BIRCH PO BOX 747 FALLS CHURCH, VA 22040-0747			EXAMINER GOFF II, JOHN L	
			ART UNIT	PAPER NUMBER
			1733	
SHORTENED STATUTORY PERIOD OF RESPONSE		NOTIFICATION DATE	DELIVERY MODE	
3 MONTHS		04/25/2007	ELECTRONIC	

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Notice of this Office communication was sent electronically on the above-indicated "Notification Date" and has a shortened statutory period for reply of 3 MONTHS from 04/25/2007.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

mailroom@bskb.com

Office Action Summary

Application No.

10/539,074

Applicant(s)

YAMAGUCHI ET AL.

Examiner

John L. Goff

Art Unit

1733

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 15 June 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-7 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-7 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 6/15/05.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 1-7 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

3. Claim 1 requires “impregnating a surface and an interior of an aramid paper with a liquid crystal polymer, and laminating a layer comprising an aramid paper and a layer comprising a liquid crystal polymer”. The claim is unclear and confusing. Does the claim require impregnating an aramid paper with a liquid crystal polymer and then laminating a layer of an aramid paper and a layer of liquid crystal polymer to the impregnated paper? Does the claim require providing a layer comprising an aramid paper, providing a layer comprising a liquid crystal polymer, and laminating the layer comprising an aramid paper and the layer comprising a liquid crystal polymer such that a surface and an interior of the aramid paper is impregnated with the liquid crystal polymer? In view of the specification (See in particular page 28, first and second full paragraphs) it appears the claim requires the latter. This is the interpretation given the claim by the examiner. It is suggested that in order to overcome the rejection applicants delete from claim 1 “impregnating a surface and an interior of an aramid paper with a liquid crystal polymer, and laminating a layer comprising an aramid paper and a layer comprising a liquid crystal polymer” and insert therein - - providing a layer comprising an aramid paper,

Art Unit: 1733

providing a layer comprising a liquid crystal polymer, and laminating the layer comprising an aramid paper and the layer comprising a liquid crystal polymer such that a surface and an interior of the aramid paper is impregnated with the liquid crystal polymer - -.

4. Claim 4 requires “a temperature range of a temperature lower than a flowing temperature of a liquid crystal polymer by 30 °C to lower than 400 °C”. This limitation is unclear and confusing as it appears to require the temperature range is 30 to 400 °C lower than the flowing temperature. However, page 28, last full paragraph of the specification describes the temperature range is by 30 °C lower to 400 °C higher than the flowing temperature including describing disadvantages of going more than 30 °C lower or 400 °C higher. Therefore, the examiner has interpreted the range as by 30 °C lower to 400 °C higher than the flowing temperature. It is suggested that in order to overcome the rejection applicants delete from claim 4 “lower than 400 °C” and insert therein - - higher than a flowing temperature of a liquid crystal polymer by 400 °C - -.

Claim Objections

5. Claims 2, 3, and 6(2) are objected to because of the following informalities: In claim 2, line 3 delete “in”. In claim 2, line 3 after which insert - - comprises - -. In claim 2, line 4 delete “is” and insert therein - - as - -. In claim 2, line 5 before “liquid” insert - - the - -. In claim 2, line 5 delete “is” and insert therein - - as - -. The changes are suggested such that it is clear the liquid crystal polymer comprises (A) and (B). Appropriate correction is required.

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

7. Claims 1, 6(1), and 7 are rejected under 35 U.S.C. 102(e) as being anticipated by Samuels et al. (U.S. Patent 6,929,848).

Samuels et al. disclose a process for preparing an aramid laminate comprising providing a layer comprising an aramid paper, providing a layer comprising a liquid crystal polymer film, and applying heat and pressure to the layers to impregnate a surface and an interior of the aramid paper with the liquid crystal polymer and thermally fuse, i.e. laminate, the layer comprising an aramid paper and the layer comprising a liquid crystal polymer film (Figures 1 and 2 and Column 3, lines 22-54 and Column 4, lines 15-20 and Column 5, lines 15-31 and 61-67 and Column 6, lines 1-19 and Column 7, lines 42-67 and Example 1). Regarding claim 7, Samuels et al. further teach forming a circuit substrate comprising the aramid laminate (Column 9, lines 28-31).

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

10. Claims 2, 3, and 6(2) are rejected under 35 U.S.C. 103(a) as being unpatentable over Samuels et al. in view of Furuta et al. (U.S. Patent 6,124,004).

Samuels et al. is described above in full detail. Samuels et al. teach all of the limitations in claims 2, 3, and 6(2) except for a specific teaching that the liquid crystal polymer is a liquid crystal polyester resin composition comprising (A) liquid crystal polyester as a continuous phase and (B) a copolymer having a functional group having reactivity with the liquid crystal polyester as a dispersion phase, it being noted Samuels et al. are not limited to any particular liquid crystal polymer. Furuta et al. disclose a process for preparing an aramid laminate comprising providing a layer comprising an aramid fiber, providing a layer comprising a liquid crystal polymer film, and applying heat and pressure to the layers to thermally fuse, i.e. laminate, the layer comprising

Art Unit: 1733

an aramid fiber and the layer comprising a liquid crystal polymer film (Column 1, lines 12-21 and Column 2, lines 32-46 and Column 13, lines 28-34). Furuta et al. teach the liquid crystal polymer is a liquid crystal polyester resin composition comprising 56.0 to 99.9% by weight of (A) liquid crystal polyester as a continuous phase and 44.0 to 0.1% by weight of (B) a copolymer having a functional group having reactivity with the liquid crystal polyester as a dispersion phase, and Furuta et al. teach the liquid crystal polymer has good heat resistance, gas barrier, and mechanical properties (Column 9, lines 50-64). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use as the liquid crystal polymer in Samuels et al. the liquid crystal polymer taught by Furuta et al. which has good heat resistance, gas barrier, and mechanical properties.

11. Claims 4 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Samuels et al.

Samuels et al. is described above in full detail. Samuels et al. teach as exemplary thermally fusing the layer comprising an aramid paper and the layer comprising a liquid crystal polymer film at a temperature of 350 °C and a linear pressure higher than 20 kg/cm (Example 1). However, Samuels et al. do not specifically disclose the thermal fusing temperature is in a temperature range of a temperature lower than a flowing temperature of the liquid crystal polymer by 30 °C to higher than a flowing temperature of the liquid crystal polymer by 400 °C. It is noted in view of the specification page 28 last full paragraph that the flowing temperature is at least considered the melting temperature of the liquid crystal polymer. Samuels et al. teach the thermal fusing temperature is at least near the melting point of the liquid crystal polymer and that the thermal fusing pressure and temperature are determined in such a manner that a controlled

Art Unit: 1733

flowing of the liquid crystal polymer is produced (Column 7, lines 11-31). Absent any unexpected results, it would have been obvious to one of ordinary skill in the art at the time the invention was made to experimentally determine the thermal fusing pressure and temperature in Samuels et al. such that the desired controlled flowing of the liquid crystal polymer is produced as doing so would have required nothing more than ordinary skill and routine experimentation.

12. Claims 1-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Furuta et al. in view of Kirayoglu et al. (U.S. Patent 5,223,094).

Furuta et al. disclose a process for preparing an aramid laminate comprising providing a layer comprising an aramid fiber, providing a layer comprising a liquid crystal polymer film, and applying heat and pressure to the layers to thermally fuse, i.e. laminate, the layer comprising an aramid fiber and the layer comprising a liquid crystal polymer film (Column 1, lines 12-21 and Column 2, lines 32-46 and Column 13, lines 28-34). Furuta et al. teach the liquid crystal polymer is a liquid crystal polyester resin composition comprising 56.0 to 99.9% by weight of (A) liquid crystal polyester as a continuous phase and 44.0 to 0.1% by weight of (B) a copolymer having a functional group having reactivity with the liquid crystal polyester as a dispersion phase (Column 9, lines 50-64). Furuta et al. teach the aramid laminate is used to make circuit substrates (Column 1, lines 5-31). Furuta et al. do not specifically disclose the layer comprising an aramid fiber is a paper, it being noted Furuta et al. are not limited to any particular form of the layer suggesting textile, nonwoven, etc. (Column 13, lines 56-58). Kirayoglu et al. disclose an aramid paper formed of aramid fibers used to make circuit substrates having high strength and high porosity to make it easier to impregnate with resins (Column 1, lines 5-30). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use as the

Art Unit: 1733

layer comprising aramid fiber taught by Furuta et al. the aramid paper shown by Kirayoglu et al. having high strength and high porosity.

As to the limitation of impregnating a surface and an interior of the aramid paper with the liquid crystal polymer, it is noted Furuta et al. do not specifically teach that the application of heat and pressure to thermally fuse the layer comprising an aramid fiber and the layer comprising a liquid crystal polymer film also impregnates a surface and an interior of the aramid fiber layer with the liquid crystal polymer. However, Furuta et al. as modified by Kirayoglu et al. teach the layer comprising aramid fiber is an aramid paper having high porosity which is easily impregnated with resin such that the thermal fusing step taught by Furuta et al. as modified by Kirayoglu et al. is considered to impregnate a surface and an interior of the high porosity aramid paper with the liquid crystal polymer.

Regarding claims 4 and 5, Furuta et al. do not specifically disclose the thermal fusing temperature is in a temperature range of a temperature lower than a flowing temperature of the liquid crystal polymer by 30 °C to higher than a flowing temperature of the liquid crystal polymer by 400 °C and the linear pressure is 20 kg/cm or higher. However, Furuta et al. teach the temperature is near the flow temperature of the liquid crystal polymer, and both the temperature and pressure are suitably selected according the properties of the liquid crystal polymer film and aramid fiber (Column 12, lines 19-22 and Column 13, lines 35-39). Absent any unexpected results, it would have been obvious to one of ordinary skill in the art at the time the invention was made to experimentally determine the thermal fusing pressure and temperature in Furuta et al. as modified by Kirayoglu et al. as a function of the properties of the liquid crystal

Art Unit: 1733

polymer film and aramid fiber as doing so would have required nothing more than ordinary skill and routine experimentation.

Conclusion

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to **John L. Goff** whose telephone number is **(571) 272-1216**. The examiner can normally be reached on M-F (7:15 AM - 3:45 PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richard Crispino can be reached on (571) 272-1226. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



John L. Goff
Patent Examiner
Art Unit 1733